Chemical & Engineering NEWS

Forces mobilize to combat "creation science" Page 12

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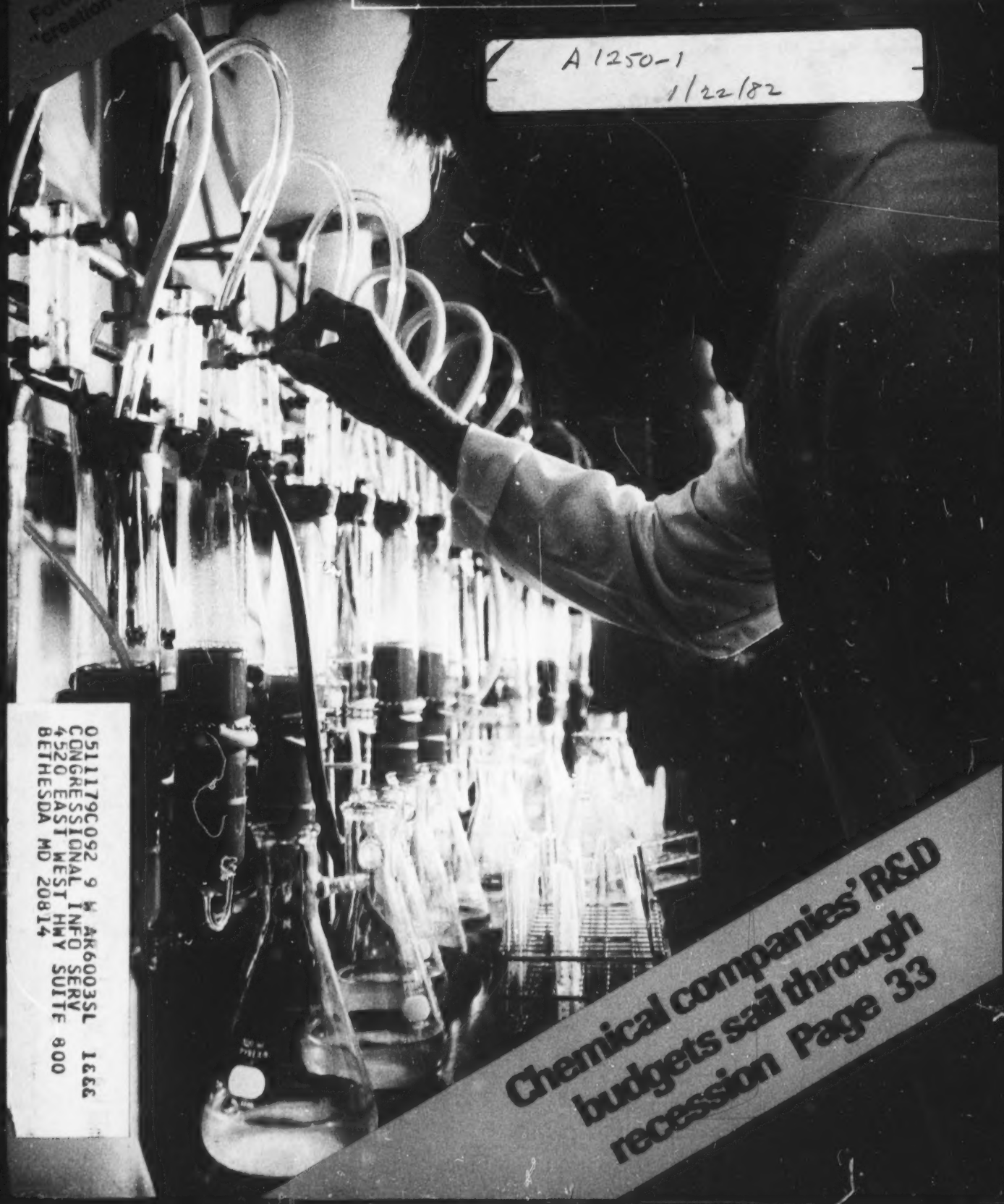

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Chemical companies' R&D budgets sail through recession Page 33

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Chemical & Engineering NEWS

Cover: Monsanto scientist works on phosphorus biodegradation at company's research center in St. Louis

4 Letters
7 Editor's Page

Concentrates
30 Business
44 Government
56 Science/Technology

The Departments
70 New Products
85 ACS Comment
110 Newscripts

News of the Week

- ***OCAW has settled for less than it wanted*** *in wages, other benefits in contract negotiations with oil companies, hinting at what other unions will face.* ***Page 8***
- ***Inner-city children are at higher risk to lead exposure*** *than the general child population, national survey confirms.* ***Page 9***
- ***GAF has completed*** *the bulk of its corporate reorganization with the sale of its reprographic business.* ***Page 9***
- ***Organizational changes at the National Cancer Institute*** *mark shift in emphasis in several basic science programs.* ***Page 10***
- ***Unusual drug for treating depression,*** *made by Mead Johnson, has been okayed for marketing by FDA.* ***Page 10***
- ***Imperial Chemical Industries is buying*** *all of Rubicon Chemicals, which has been a joint venture of ICI and Uniroyal.* ***Page 10***

News Focus

- ***Creationism is under attack*** *by scientists and educators to prevent it from being taught as science.* ***Page 12***

Business

- ***Chemical firms plan 17% hike in R&D funding*** *this year to $2.62 billion following $2.24 billion in 1981.* ***Page 33***
- ***Reinforced plastics market*** *appears to be on the upswing again.* ***Page 36***

Government

- ***Cooperation, setting of realistic goals*** *are best approach to FDA problems, says Commissioner Arthur Hayes Jr.* ***Page 45***
- ***Detailed look*** *at the state of technical world is offered in NSF study.* ***Page 49***

Science

- ***Normally unreactive hydrocarbon bonds*** *can be activated to lose hydrogen in soluble metal complexes.* ***Page 59***
- ***Structure of specialized cells in eye's lens,*** *including family of unique proteins, is being explored.* ***Page 63***

Technology

- ***Public acceptance of nuclear power is declining*** *and government must consider new attitudes, social scientists say.* ***Page 73***
- ***Samples of coal*** *from three beds are available from repository for study.* ***Page 79***

Books

- ***"From Chance to Purpose: An Appraisal of External Human Fertilization"*** *discusses issues of test-tube fertilization.* ***Page 81***

ACS News

- ***Chemical Abstracts,*** *marking its 75th anniversary this year, today monitors some 12,000 scientific journals.* ***Page 86***

Company R&D budgets set for robust 1982

As recession continues, U.S. chemical firms plan strong 17% increase in R&D funding this year after higher than expected 21% gain in 1981

William F. Fallwell
C&EN, Washington

As the U.S. recession has deepened in the past few months, chemical companies have put a lot of budgets under the microscope for a second look. Some funding plans such as capital spending (C&EN, Dec. 14, 1981, page 13) wound up notably trim. But one budget area, research and development, has survived the ordeal in exceedingly strong shape.

It's almost as if hard times, plus an austerity program from the federal government, have convinced companies to plow even more of their scarce dollars into work aimed at new markets in the future. There's more to it than that, however. A combination of forces is boosting R&D: the promise of brand new products, especially in biochemistry; heavier commitments to meet new regulations; new federal tax incentives; foreign competition; and a new-found corporate urge for premium-priced, high-value-added products for the 1980s as commodity chemicals face rough times.

The result is an extraordinary surge in R&D support in the basic chemical industry, which more than most manufacturing supplies its own R&D funds. Although the recession is eroding profits, and R&D costs directly affect profits, chemical R&D budgets are due a fourth straight year of growth well above inflation. Since salaries are by far the largest part of R&D costs, such growth translates into continued expansion in R&D staffs and projects. The corporate job market for R&D professionals will stay bright.

Specifically, C&EN's annual R&D budget survey for the largest basic chemical companies finds an overall worldwide 17% increase in initial estimates for 1982 from 1981. The 15 companies in the survey plan $2.62 billion in R&D support this year after $2.24 billion last year.

This gain follows a larger than expected 21% increase in R&D funding in 1981 from $1.85 billion in 1980. A year ago, these companies expected an increase of 14% in 1981 (C&EN, Jan. 19, 1981, page 26).

Although a few companies are making spectacular, possibly one-time, increases in R&D money, the industry's gain is not especially skewed by these cases. The upsurge runs across the board among companies with nearly all in C&EN's survey showing double-digit increases for both 1981 and 1982.

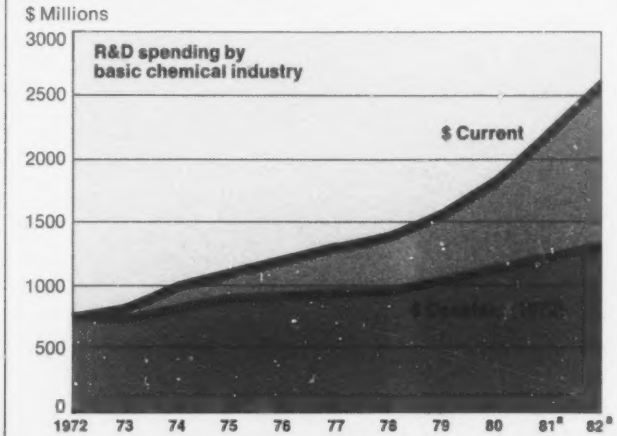
Since inflation affecting R&D, in data supplied by Battelle Columbus Laboratories, remains in single digits (7.7% in 1982 after 9.3% in 1981), every company in the survey will have real growth in R&D this year. As a group, these firms are propelling R&D funding at more than twice the inflation rate.

One result is that companies' R&D budgets finally are moving up again in relation to sales. After falling from 4.0% of sales in the late 1960s to a low point of 2.5% in 1979, R&D budgets have picked up three years in a row. This year, R&D funding has a good chance to reach 3.0% of sales, a level not seen since 1973.

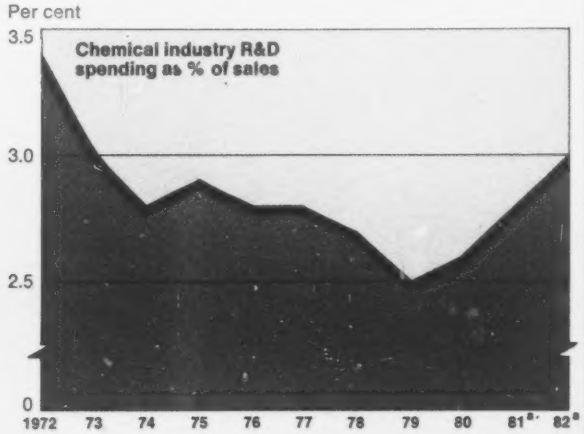
Professional employment in R&D will show the effects with another solid gain. C&EN's latest employment survey (C&EN, Oct. 19, 1981, page 50) finds companies planning a net expansion of 2% for chemists and 4% for chemical engineers from mid-1981 to mid-1982.

The cumulative effect of the chemical industry's R&D renaissance in the past several years is striking.

R&D budgets rise well above inflation rate in 1982 . . .



. . . and probably will pick up again as a percentage of company sales



a Estimates. **Sources:** C&EN survey, Battelle Columbus Laboratories

Every company plans substantial boost in R&D funding in 1982 after sizable gains in 1981

$ Millions	Worldwide R&D spending								Change from previous year		R&D spending as % of sales	
	Planned 1982	Actual 1981	Planned 1981	1980	1979	1978	1977	1976	1982	1981	1981	1980
Air Products	$ 35	$ 32	$ 32	$ 30	$ 24	$ 23	$ 24	$ 19	9%	7%	2.0%	2.1%
Akzona	34	30	33	28	25	23	20	18	13	7	2.4	2.7
Allied Corp.	190	148	137	105	70	56	51	40	28	41	2.3	1.9
American Cyanamid	180	160	160	142	124	108	96	83	13	13	4.4	4.1
Celanese	118	105	105[a]	94	92	83	77	70	12	12	2.7	2.8
Diamond Shamrock	64	52	60	50	42	36	29	24	23	4	1.5	1.6
Dow Chemical	525	457	370	314	269	232	203	188	15	46	3.8	3.0
Du Pont[b]	670	575	535	485	415	377	367	353	17	19	3.8	3.6
W. R. Grace	65	51	54	45	42	37	32	28	27	13	0.8	0.7
Hercules	66	58	57	53	47	40	37	35	14	9	2.1	2.1
Monsanto	260	230	230	204	161	136	132	114	13	13	3.2	3.1
Pennwalt	34	28	28	26	24	23	21	19	20	8	2.3	2.2
Rohm & Haas	90	75	73	67	54	49	45	43	20	12	3.8	3.9
Stauffer Chemical	62	51	52	44	37	34	33	29	22	16	2.8	2.6
Union Carbide	222	186	188	166	161	156	156	143	19	12	1.8	1.7
TOTAL[c]	$2615	$2238	$2114	$1853	$1587	$1409	$1323	$1206			2.8%	2.6%
ANNUAL CHANGE	17%	21%	14%	17%	13%	7%	10%	9%				

a C&EN estimate. b Excludes Conoco. c Percentage figures are averages.

Since a real-dollar low point in 1973, R&D budgets have increased 75% in constant dollars and have tripled in current dollars. R&D professional staffs have grown about 20%. And corporate commitment to R&D has been transformed from vague skepticism or variable favor at many companies to rock solid support.

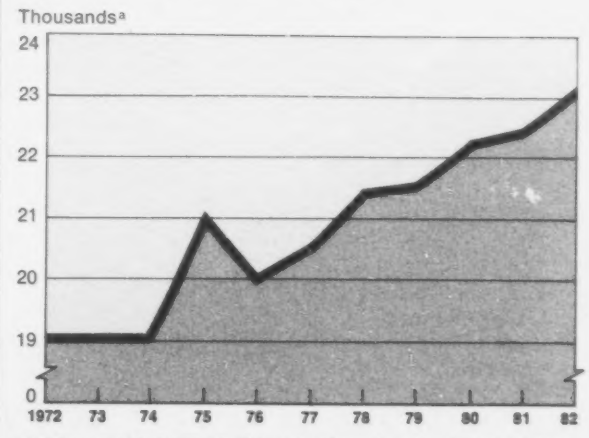
Although this boardroom appeal has been sweetened from Washington, D.C., in the past six months by new tax legislation, it is obvious from comparison with other industries that chemical companies are pushing R&D especially hard. For example, Battelle's new R&D funding survey finds an overall revised 11.4% increase by industry in 1982, 3.7% ahead of R&D inflation (C&EN, Jan. 4, page 6).

Although all chemical companies in C&EN's survey could be cited for strong R&D growth, a few stand out from a fast pack. Once more on the rise after a flat mid-1970s, Du Pont (excluding recently acquired Conoco) plans a 17% gain in 1982 to $670 million after a 19% increase to $575 million in 1981.

Not that far behind Du Pont any more, Dow Chemical expects R&D budgeting to reach $525 million in 1982 for a typical 15% gain after a one-time gain of 46% in 1981 to $457 million. The 1981 upsurge was mostly the result of Dow's absorbing its new drug acquisition from the former Richardson-Merrell.

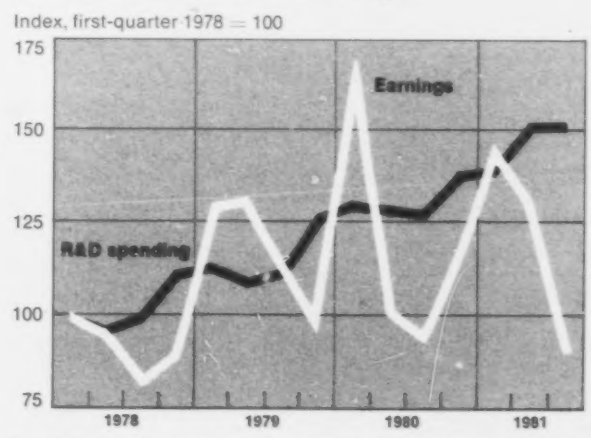
Two other companies with booming R&D budgets are Allied Corp. and Union Carbide. Allied's R&D is, in terms of per cent, the industry's fastest growing in the past decade, soaring sixfold to $190 million this year from about $30 million in the early 1970s. Carbide is on the move again in 1982 with a planned R&D increase of 19% to $222 million after small growth in the previous five years. □

Companies continue steady rise in professional R&D staffs . . .



a Full-time equivalent R&D scientists and engineers in basic chemical industry at beginning of year. **Sources:** National Science Foundation, C&EN surveys

. . . as R&D funding rises smoothly, generally faster than earnings



Sources: Combined data from American Cyanamid, Celanese, Diamond Shamrock, Dow Chemical, Monsanto, Stauffer Chemical, and Union Carbide

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Hamilton Solidum, Vice President, Manufacturing, Glines & Rhodes, Inc., precious metals refiners, Attleboro, Massachusetts

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Reinforced plastics on road to recovery

If reinforced plastics producers are correct, 1982 will bring them back close to 1979's record production level after a disasterous 1980 and a so-so 1981. And next year's level may even exceed the record.

A consensus of producers is that 1982 volume growth will fall short of last year's; thus demand for reinforced plastics will not hit 2 billion lb yet this year. They predict that shipments will grow 5.2% from last year to 1.92 billion lb in 1982. Last year, reinforced plastics shipments rose 7.5% from 1980 levels to 1.82 billion lb.

These figures were revealed last week at the annual conference of the Reinforced Plastics/Composites Institute of the Society of the Plastics Industry held in Washington, D.C. The figures are part of a survey of producers and others in the industry compiled by Laura Morrison of the public relations firm Morrison-Gottlieb, New York City.

According to the survey, the biggest growth category for reinforced plastics in 1981 was the aircraft industry. This market, though the smallest charted by the survey, increased 12% from 1980 to 28 million lb. Aircraft use of reinforced plastics is expected to maintain its growth lead again in 1982, climbing 10.7% to 31 million lb.

The biggest use of reinforced plastics—land transportation—had one of the slowest demand increases in 1981. This was, of course, because of the sluggish automobile market. However, in spite of the cries of woe coming from Detroit, reinforced plastics managed a 7% increase in use for land transportation in 1981 to 445 million lb. However, reinforced plastics makers see demand for their products for land transportation struggling for only a 2.7% gain in 1982 to 457 million lb.

The reinforced plastics market hardest hit by the recession has been marine uses, suffering longer and harder than other markets. Unlike the other markets, marine uses, mainly for small, recreational boat hulls, reached their peak in 1978 at 430 million lb and then declined solidly for two straight years, followed by only a 5.5% increase in 1981 to just 290 million lb. For this year, producers expect no growth in marine uses, so consumption by the end of 1982 still will be 33% less than peak demand in 1978. This is

Reinforced plastics demand in 1982 still below 1979 levels

Millions of lb	1982[a]	1981[a]	1980	1979	1978	1977	% change 1981–82	% change 1980–81	Average annual change 1977–82
Transportation, land	457	445	416	550	535	374	2.7%	7.0%	−1.0%
Marine	290	290	275	385	430	400	nc	5.5	−5.9
Construction	327	309	287	335	320	266	5.8	7.7	2.7
Anticorrosion	302	275	252	238	216	192	9.8	9.1	9.5
Electrical	196	178	162	190	170	147	10.1	9.9	5.9
Appliance	117	112	104	130	123	112	4.5	7.7	0.9
Consumer goods	118	110	103	126	116	107	7.3	6.8	2.0
Aircraft	31	28	25	23	22	21	10.7	12.0	8.1
Other	78	74	70	79	74	70	5.4	5.7	2.2
TOTAL	1916	1821	1694	2056	2006	1810	5.2%	7.5%	1.1%

a Estimates. nc = no change. Source: Reinforced Plastics/Composites Institute of the Society of the Plastics Industry

hardly surprising, though, because during a recession recreational markets for any product are usually the first to slip.

Construction uses for reinforced plastics, in spite of continued recession and high interest rates, chalked up a relatively good increase in 1981 of 7.7% to 309 million lb. However, growth in this area is expected to slow in 1982 to 5.8%, with demand likely hitting about 327 million lb.

Other than aircraft markets, the best growing outlets for reinforced plastics last year were in corrosion-resistant equipment and electrical products. Corrosion-resistant equipment uses increased 9.1% to 275 million lb in 1981, and electrical markets grew about 9.9% to 178 million lb. These two markets are expected to continue to do well this year. The survey indicates that the market in corrosion-resistant equipment may increase a further 9.8% in 1982, and that in electrical uses may rise at an even faster 10.1%

Thus, reinforced plastics, many of whose uses are closely tied to the economy and are therefore highly cyclical, are beginning to recover. But, even with a 5.2% growth this year, the industry still will be almost 7% below consumption levels in 1979, its most recent good year.

William Storck, New York

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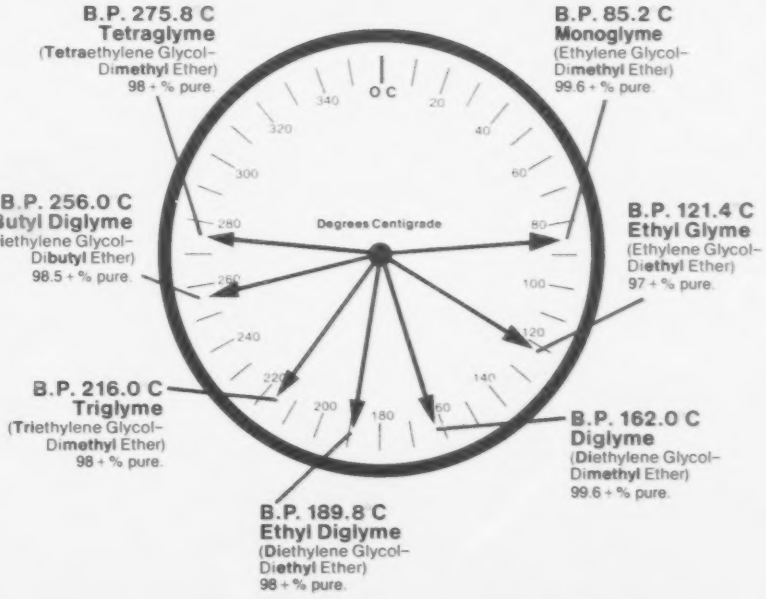

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Government

NSF study gives global technology picture

It may be anachronistic and inward looking in an age of confusing social and economic problems, but the fifth version of the National Science Foundation's "Science Indicators—1980" is out and like its predecessors, its content overwhelms.

It tells a tale of the U.S. scientific and technological giant that is big and moving on a powerful momentum. It contains little interpretation, no warnings, no social philosophy, only facts—facts in profusion.

But taken on its own terms, "Science Indicators" does offer a full diagnosis of the state of the technical world. It documents the continuing decline of American pre-eminence in technology around the world in comparison to the rise of Japan and Europe. It tells of threats, however, to Japan and West Germany through the technological buildup of such once-deficient cousins as Taiwan, Hong Kong, South Korea, Singapore, and Brazil.

It says that although the U.S. may be fading—and such terms should be hedged—in world technological competition, the U.S. stands to be the world leader for a long time to come in educating foreigners in the ways of research and development. About 300,000 foreigners currently are enrolled in U.S. colleges and universities. One significant lag the report points out is reluctance of U.S. innovators to develop capital-saving and material-saving technologies as Japan and West Germany have done, favoring instead labor-saving innovations, reflective of an affluent, abundant society.

One feature of this edition is a section on public attitudes toward science and technology, revealing a country on the whole friendly toward that view of progress. But 53% of 1635 individuals surveyed said science and technology are changing their lives too quickly. A full 65% believes scientists should not be studying ways to create new forms of life.

But 81% of what the study called "attentives"—those who claim a deep and continuing interest in scientific progress—think scientists will solve the energy problems, predict earthquakes, find the cure to cancer, and desalt seawater cheaply in the next 25 years. Fully 78% see harm in the continued development of nuclear power, and 62% don't want a nuclear power plant in their areas. Attentives, however, support nuclear power.

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The manpower section offers some food for thought through its report of an 8% decline in science jobs between 1976 and 1978, except for computer specialists and environmental engineers. Engineers and computer specialists are in short supply, while biological and social scientists are having relatively more difficulty finding work. "In recent years," the report says, "employment in science and engineering has grown more slowly (2.5% per year) than total U.S. employment and GNP (4% per year), indicating shifts in national activity patterns away from those related to science and technology."

Opportunities for doctorate holders in industrial jobs appear to be increasing, with industry now employing 13% of Ph.D. holders as opposed to only 10% in 1970. Highly ominous is the declining employment opportunities for young Ph.D.s in academia. The proportion of doctorate holders in science and engineering under the age of 35 in colleges and universities declined 30%. Moreover, says the report, "this decline might have been greater except that the number holding postdoctoral appointments (who are generally under 35) almost doubled."

Within the past three years or so, industry has been taking more interest in supporting and cooperating in scientific research in universities, especially in such fields as genetic research, microelectronics, and robotics. This development is not underscored in the study, but the trend toward joint industry-academic authorship is. The number of jointly authored articles increased 9% between 1973 and 1979, with biology and mathematics in the lead. In 1979, 17% of all papers authored by industrial researchers had academics as coauthors.

Yet, industrial research continued to decline in terms of output—even as industrial funding for development continued to soar. Published technical articles in eight fields declined 21% during that seven-year period, "well above the 4% drop in such publications by all U.S. authors."

The international science and technology picture is probably the most relevant to the future health of the U.S. system, and this section is loaded with factual nuggets.

America's comparative advantage in technological product output may be finding a lower equilibrium compared with the booming postwar years when Japan and Western Europe were recovering from the war. But the U.S. still sells about nine times more technology than it buys. Moreover, it vastly outspends any single competitor in research and development—$48.5 billion in 1978 compared with $46.5 billion for France, West Germany, and Japan combined.

Innovations from U.S., Europe, Japan 1945–74

Perceived advantage at time of introduction	Number	Per cent[a]
United States	**826**	**100%**
Labor-saving	331	40
Material-saving	175	21
Capital-saving	58	7
Novel function	106	13
Safety	50	6
Multiple and other	106	13
Europe[b]	**946**	**100**
Labor-saving	120	13
Material-saving	444	47
Capital-saving	104	11
Novel function	83	9
Safety	60	6
Multiple and other	135	14
Japan	**94**	**100**
Labor-saving	6	6
Material-saving	32	34
Capital-saving	7	7
Novel function	12	13
Safety	7	7
Multiple and other	30	32

a Per cents may not add to 100 because of rounding. b The nine nations included are Austria, Belgium, France, West Germany, Italy, the Netherlands, Sweden, Switzerland, and the U.K.

The picture is, more than anything, confusing. The confusion comes from observing that the U.S. remains the most powerful market for science and technology of any single country or group of regional countries in the world. It is so big and rich that it can sell to itself and leave more than enough room for imports than any other region. Compared to any other country, it is safer and less fragile as witnessed by the enormous foreign investment in land, banks, and businesses. With these facts, are the figures that display "technological decline" in the U.S. really all that relevant? The report doesn't say.

What is happening more and more is that U.S. high-technology companies are exporting their know-how, increasing R&D activity abroad, and transferring technology faster than any other international entity. U.S. investment abroad, says the study, reached $74.2 billion in 1978. The amount of R&D done by these firms reached $2.7 billion in 1979, equal to about 11% of total 1978 U.S. industrial R&D funds. On the other hand, foreign companies spent $898 million for R&D in the U.S. affiliates.

"There is evidence," says the study,

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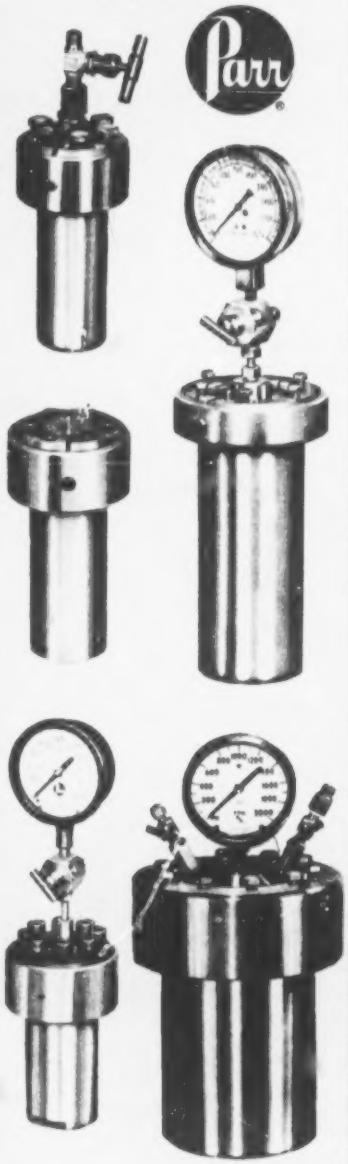

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"that the preferred mode of technology transfer, and therefore the source of technological earnings, is through U.S. subsidiaries abroad. Additionally, it is possible that U.S. innovations with a labor-saving orientation may not be as relevant to today's needs as they once were. Japanese and European capital-saving and energy-saving innovations may be more in demand."

The last point could be the key to the competitive future and was examined in only a couple of pages in the report. The phenomenon seems to indicate that Japan and West Germany have come to terms earlier than the U.S. with the era of scarcity, especially with regard to capital. It will take vast amounts of capital to open new mines, develop fusion energy, build conventional nuclear plants, and renew outmoded industrial machinery. In other words, those countries could have a sharper sense of the future than the U.S. and could be in a better position to help the U.S. than the U.S. itself if scarcity worsens in the Western Hemisphere.

No one really knows. One can only gather facts. And this is what "Science Indicators" presumably will continue to do. But are facts enough in an era of uncertainties? Shouldn't "Science Indicators" offer more of a strategic guidepost to the future or at least be related to the broader question of human welfare?

Some think it should. In a paper appearing in the current issue of *Science, Technology, and Human Values*, published jointly by Harvard and Massachusetts Institute of Technology, Robert S. Morison, visiting professor of science and society at MIT, says exactly that.

Morison says "Science Indicators" should begin with a description of social needs, followed by statistical attempts to determine how science and technology are meeting those needs. Instead, he says, "Indicators" is merely an index of how science and technology relate to themselves, or at most to technical competition.

Indicators, he says, "tell us little about the state (or 'health') of science as a whole." Indeed, Morison continues, "One begins to suspect that there is no such thing. Perhaps the best we can do is to select a series of goals and ask ourselves how close we are to each one. Those so inclined could then sum up these to produce a single global figure, although there is no reason to suppose that such a 'whole' would be any greater than the sum of its parts."

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Public acceptance of nuclear power declining

Reagan Administration must consider public's changing attitudes toward energy options as it tries to raise support for nuclear power

James H. Krieger
C&EN, Washington

To say the least, the past decade hasn't been kind to nuclear power. Now, however, the Reagan Administration is hoping to bring about a rejuvenation of that energy technology as part of its energy program. Whether it can or not may well depend on public opinion.

Early this month, a number of social scientists were in Washington, D.C., at the annual meeting of the American Association for the Advancement of Science, trying to read nuclear power's lifeline to see if nuclear has any hope for a brighter future. Specifically, they were examining public attitudes toward nuclear energy to see what effect those attitudes might have.

The bottom line on public acceptance of nuclear power is drawn by sociology professor Eugene A. Rosa, coordinator of the Public Opinion Laboratory at Washington State University. The public climate for the rapid expansion of nuclear power, he says, appears to be less propitious now than perhaps at any time since the immediate aftermath of the accident at Three Mile Island in the spring of 1979. Partly counterbalancing this bleak picture, however, Rosa says, is evidence showing that there is less polarization among the public over the nuclear option than is claimed by many energy experts and policy makers.

This public attitude, Rosa maintains, is something that policy makers must take into account. At one time, nuclear's problems—reactor safety design or ways of handling radioactive waste—might have been considered as being amenable to engineering solutions. But no longer.

"What was once deemed solely an issue of technological feasibility and economic advantage," Rosa says, "is now—more than ever—an issue of public acceptance." Sociologist William R. Freudenburg of Washington State University echoes the theme: "It is becoming increasingly apparent that social, political, and human value questions are at the very core of the nuclear stalemate."

If so, it may be bad news for the Reagan Administration's nuclear program. Administration budgets have included increased support for nuclear power, while at the same time reducing support for alternative sources of energy, particularly solar power and conservation. The President has announced an official Administration plan to create a more supportive environment for nuclear power, and to rehabilitate the nuclear power industry.

This approach, Rosa suggests, may be counterproductive. The evidence from analysis of public opinion surveys, he says, suggests that a national policy that emphasizes differences between nuclear power and conservation in strikingly oppositional terms seems less destined to gain public support than a policy that makes room for both options. Devoting major efforts toward nuclear power at the expense of conservation may very well prolong the high level of opposition to nuclear power.

Policy implementation cannot ignore public preferences, Rosa says, whatever the resolution of other key issues may be. Public policy makers may not be very responsive to the public mood. Nevertheless, the public climate establishes the broad boundaries within which decision makers must operate.

William L. Rankin, a research scientist at Battelle Human Affairs Research Center, Seattle, has taken a look at that public climate over time. In 1977, he and his colleagues obtained more than 100 surveys of national, state, and areawide sampling scope. Different research firms used different questions to ascertain public attitudes toward nuclear power. In general, however, Rankin notes that two types of questions were asked to probe nuclear attitudes: whether respondents generally favored or opposed building more nuclear power plants, and whether the respondents favored or opposed building a nuclear power plant "nearby" (within 5 to 20 miles of the respondents' homes). Subsequent surveys have been used to bring the longitudinal analysis up to date.

It appears, Rankin says, that general attitudes toward nuclear power remained quite stable through 1976. On a general level there was a ratio of almost 3:1 in favor. Even on the question regarding a nuclear plant nearby, the public favored such construction about 1.5:1.

An analysis of survey data collected by five national research firms from 1971–76 did not indicate any clear trend over time in support or opposition to the general question of nuclear power, Rankin says. There was some indication, however, that acceptance of local power plants was decreasing.

Since 1976, however, a great deal has happened that may have in-

Nuclear energy is least popular of alternatives

Energy alternatives	Chosen in top three preferred		Top three minus least preferred	
	SERI[a]	CEQ[b]	SERI[a]	CEQ[b]
Solar energy	66%	61%	63%	55%
Energy conservation	45	35	41	32
Synfuels	38	26	33	16
Hydropower	34	31	26	21
Coal	36	36	23	27
Oil and natural gas	34	28	22	19
Nuclear energy	27	23	−16	−10

a Data from Gallup national survey of homeowners conducted for the Solar Energy Research Institute, Oct.–Nov., 1980. b Data from Roper and Cantril national survey of adults 18 and over conducted for the Council on Environmental Quality, Jan.–March, 1980.

fluenced public attitudes toward nuclear power. An increased belief in an energy shortage and foreign energy supply disruptions may have made public attitudes more positive toward nuclear power. On the other hand, reactor accidents and continued controversy over nuclear waste management may have made attitudes more negative. In any event, the most notable nuclear incident since 1976—the Three Mile Island (TMI) accident in 1979—did have a significant effect on public attitudes toward nuclear power.

Since the TMI accident, the pattern of attitudes toward nuclear power in general has become quite variable. Opposition levels exceeded support levels in several post-TMI surveys, whereas this had never happened in pre-TMI surveys. Also, the average support, opposition, and uncertainty levels pre- and post-TMI statistically were significantly different, Rankin says. Support decreased, opposition increased, and uncertainty decreased.

For local nuclear power plant construction, support decreased while opposition increased through the 1970s, Rankin points out. Although support was stronger than opposition by about 2:1 in the early 1970s, the situation now has reversed.

Taken together, these patterns suggest that general support for nuclear power appears to be "soft," Rankin says. To gauge the strength of that general public attitude toward nuclear power, Rankin and his colleagues analyzed survey questions relating to restrictions on nuclear power: operating only those plants already built, cutting back the operation of plants, and permanently closing all plants.

This analysis, Rankin says, showed that about 75% of the public opposes permanently closing all nuclear power plants. There is less strong, but still a slight majority, opposition to closing all plants until questions of safety are answered. However, there is plurality to majority support for cutting back on the operation of nuclear power plants until more strict safety regulations can be put into place.

Rankin makes the point that to predict changes in nuclear power attitudes, it's necessary to know not only the history of those attitudes and how they've changed, but to know what beliefs about nuclear power influence those attitudes.

Analysis of surveys along this line shows that beliefs about the safety of nuclear power plants are the most important in influencing nuclear power attitudes. These, Rankin says, are followed in importance by beliefs regarding the economics of nuclear power and by beliefs about nuclear power's being a long-term reliable energy source that can help free the U.S. from dependence on foreign energy sources. Also having some influence are beliefs about nuclear power plant pollution and radioactive waste disposal.

Barbara Farhar-Pilgrim, a consulting sociologist in Boulder, Colo., probes a little deeper on some of these points. On the question of local opposition to nuclear power plants, she notes that it seems that any energy source appears a good idea until it is located nearby. Yet, she says, some are more tolerable than others.

Farhar-Pilgrim notes a 1980 national survey that measured a "tolerance distance" for five types of facilities: a 10-story office building, a large factory, a coal-fired power plant, a disposal site for hazardous waste chemicals, and a nuclear power plant. Respondents were asked the closest each facility could be built to their homes before they would want to move or actively protest.

The majority of the respondents preferred that a nuclear facility be at least 50 miles away. The mean distance preferred was more than 90 miles away—the greatest distance for any of the facilities considered. Even a controlled hazardous waste disposal site was slightly more tolerable than a nuclear power plant.

Farhar-Pilgrim also analyzed studies that asked respondents to choose from among a list of possible energy supply sources. The conclusion: Nuclear energy is by far the least favored energy source; given almost any other option, the public would choose no further development of nuclear power.

The same pattern, Farhar-Pilgrim notes, holds for types of local energy facilities preferred. Data from various studies show that nuclear facilities are the least popular type of energy facility both in the abstract and in the concrete. In particular, she says, nuclear facilities are more objectionable to local populations than are any other types of energy facilities.

For Farhar-Pilgrim, an implication of her findings is that the Reagan Administration is increasing federal

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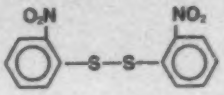

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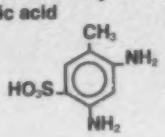

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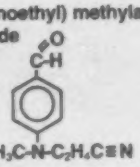

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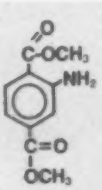

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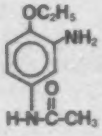

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funding for the one energy supply source that is clearly least acceptable to the American public. At the same time, government programs for the most popular energy supply sources—solar energy and energy conservation—have been cut severely.

Still, the analysis by Washington State University's Rosa indicates that the public isn't as polarized as it may appear. To get the full image of public attitudes toward nuclear power, Rosa and his colleagues turned to a particular survey and resketched the profile to allow for a broader range of energy policy positions. The survey compared nuclear and conservation attitudes. In particular, four broad classifications in policy position were made: a position favoring neither nuclear nor conservation, a conservation-only emphasis, an emphasis combining conservation with nuclear, and a nuclear-only emphasis.

This broader range of policy preferences among the public, Rosa says, provided a different picture than that obtained from an overview of survey data. One aspect of this changed picture, he says, was the sizable proportion of the public—15 to 22%, depending on stringency of criterion—favoring both the nuclear and conservation option. Another was the noticeable proportion favoring neither option—19 to 27%. Thus, Rosa points out, while a sizable proportion of the public appears to be polarized on the issue of nuclear energy versus conservation, a smaller but still sizable proportion favors both or neither.

Rosa notes that nuclear proponents differ in many ways from conservation-only proponents. They are more likely to be male, older, homeowners, longtime residents of their communities, and in the highest income category. They are less likely to see the energy situation as serious, and are somewhat less likely to favor specific conservation programs or feel they can further reduce their home energy consumption.

Large majorities of the members of all four categories favor increased development of all energy sources—in the case of solar energy, 90 to 96% across the four categories. Even persons who support neither conservation nor nuclear energy give rather strong endorsement to other energy sources. This finding, Rosa says, indicates that they are not as negatively disposed toward energy development as one might assume.

The most striking finding, Rosa says, is that regardless of policy

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preference, many people already have adopted or are adopting a range of conservation practices. It is even more striking, he says, to find those who prefer nuclear growth above all options likewise adopting a number of conservation practices.

Since actual practices are, to a large degree, independent of policy positions, Rosa argues, it may be that policy position reflects a general ideological orientation bearing little relationship to actual behavior. □

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A coal repository, recently established at the Pittsburgh Mining Technology Center of the Department of Energy, has been made available to interested parties in industry and academia. The repository was established by the Pittsburgh center's coal preparation division to provide contractors in its chemical desulfurization of coal program with well-characterized samples so that results from different projects could be directly compared.

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Samples of the coals are available in 500-lb lots. The center will charge a fee to recover splitting and shipping costs. Information can be obtained from David J. Boron, U.S. Department of Energy, Pittsburgh Mining Technology Center, P.O. Box 10940, Pittsburgh, Pa. 15236. Telephone (412) 675-6171. □

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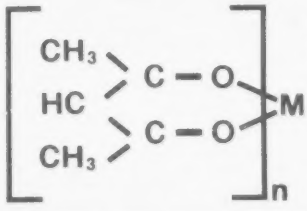

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